

Human Forward Contamination Strategic Plan

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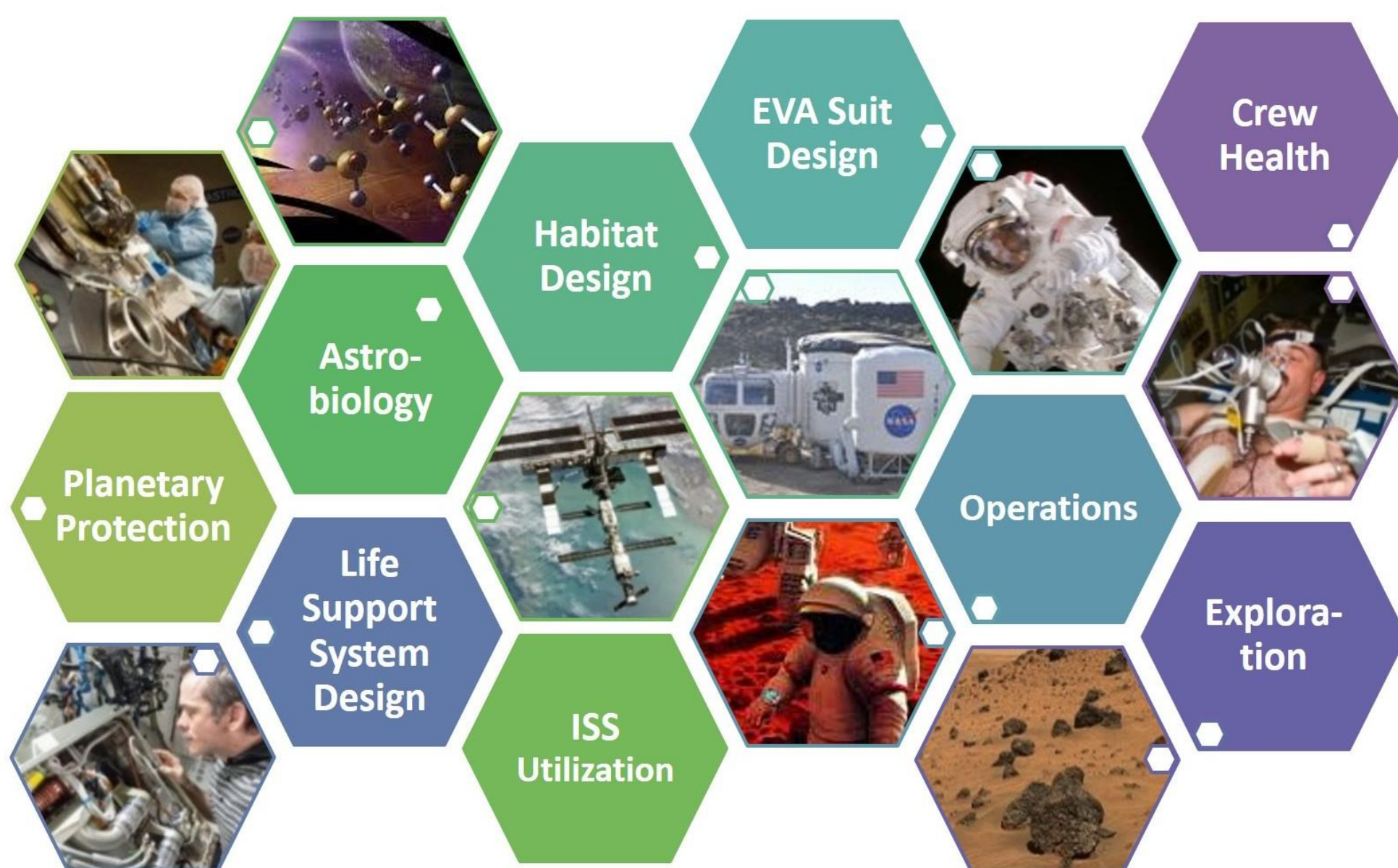
HAT: 6.1a, 6.1b, 6.2c, 6.3a, 6.3e, 6.4a, 7.3c TA: 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.2, 6.3.2, 6.4.4, 7.3.2, 7.4.1 TRL: Various up to 9

OVERVIEW

When we send humans to search for life on Mars, we'll need to know what we brought with us versus what may already be there. Unlike the Mars rovers that we cleaned once and sent on their way, humans will provide a constantly regenerating contaminant source. Are we prepared to certify that we can meet forward contamination protocols as we search for life at new destinations?

INNOVATION

This project takes a system engineering approach to roadmap the necessary experiments, analysis, and modeling needed to characterize human forward contamination into an integrated plan. Analysis of current Extravehicular Activity (EVA) spacesuits and spaceship life support systems now will help inform exploration designs now, before it becomes expensive or difficult to implement changes.



OUTCOME

The project team developed a three-part strategic plan to 1) characterize microbial contaminants leaking from spacesuits or vehicle life support systems, 2) assess how those contaminants might fare under destination environments, and 3) develop tools to predict how contaminants might spread.

This project has two spin-offs: an FY15 Innovation Charge Account project to develop an EVA swab tool,

and an FY16 project to sample a variety of EVA spacesuits to characterize microbial leakage.

INFUSION SPACE / EARTH

This project lays out a roadmap to answer a fundamental questions: how close to an area of scientific interest can crewed spaceships land, or suited crew approach?



PARTNERSHIPS/COLLABORATIONS

This project brings together engineers and scientists from 8 different JSC organizations (XM, XX, XI, CB, EA, EC, ER, SK), 3 other NASA Centers (JPL, ARC & GSFC) and 2 external organizations (SETI Institute & University of Florida). The project also has a partnership with University of California/Davis for sample analysis.

PAPERS / PRESENTATIONS

- March, 2015 NASA Planetary Protection Workshop
- October, 2015 JSC-Numbered Strategic Plan
- 2016 TBD Microbiology conference

FUTURE WORK

FY16 testing will focus on characterizing contaminants leaked from various EVA suits and flight-certifying the EVA swab tool, in preparation for eventual testing of life support system vents on board the International Space Station. Results are expected to inform advanced suit and life support system designs.